REMARKS

After entry of the above amendment, claims 1 and 3-30 are pending in the application. Claims 1, 3, 5, 6, 8, 10, 12, 14, 16, 17, 19, 21, 23, 24 and 26 have been rejected. Claims 2, 4, 7, 9, 11, 13, 15, 18, 20, 22, 25 and 28-30 have been objected to.

Amendment

Claim 1 has been amended to specifically recite that the charge control adjuvant having limited solubility in the liquid carrier is in contact with the liquid carrier. Antecedent basis for this amendment is located throughout the specification, and particularly at page 8, lines 20-23. This amendment essentially incorporates the limitation of claim 2, and therefore claim 2 is cancelled. The dependency of claim 7 therefore has been changed to depend from claim 1.

Drawing

The drawings have been objected to as being informal. Replacement drawings are enclosed herewith to overcome this objection.

Claim Rejections Under 35 USC § 112

Claim 27 has been rejected under 35 U.S.C. 112, first paragraph, the Office Action stating that the specification, while being enabling for the solubility of the charge control adjuvant in the carrier liquid, it does not reasonably provide enablement for the solubility of the matrix. This rejection is respectfully traversed.

The present invention describes a unique system for printing a liquid toner that comprises a charge control adjuvant having limited solubility in the liquid carrier. This charge control adjuvant modulates the bulk conductivity of the toner composition and/or the charge per mass of the toner particles in the toner composition without using mechanical or electronic sensing apparatuses or complex control systems. Because the charge control agent has limited solubility in the liquid carrier, the charge control agent can be provided in the form, for example of a solid, semisolid or gel, and thus is available for control of bulk conductivity of the toner composition and/or the charge per mass of the toner particles in the toner composition on an as needed basis without metered addition of additional ingredients.

Having now been taught the principle of using a limited solubility system to deliver charge control adjuvant to a liquid toner, it is a straightforward process to use the knowledge that the skilled artisan is expected to possess to carry out routine solubility evaluations of materials to identify suitable matrix materials having limited solubility in the liquid carrier of a chosen liquid toner. Thus, the skilled artisan would be expected to be able, when provided with a liquid toner system, to consider published solubility parameters and physical property data that is widely available to determine appropriate candidates for use as matrix materials. Even without reference to such published data, the skilled artisan would be expected to be well capable of using fundamental principles of solubilization of materials (e.g. "like dissolves like") to identify candidates for use as matrix materials and to conduct routine experimentation to confirm and even to optimize matrix material selection for any given liquid carrier.

In view of the teachings of the present specification in combination with the knowledge expected of the routineer in this field, it is respectfully submitted that claim 27 is fully enabled as required by the patent statutes.

Claim Rejections Under 35 USC § 103

Applicant gratefully acknowledges indication of objection to Claims 2, 4, 7, 9, 11, 13, 15, 18, 20, 22, 25, 28, 29, and 30 as being dependent upon a rejected base claim, and that such clams would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In view of the amendment to claim 1 essentially incorporating the limitations of claim 2, it is respectfully submitted that the claims are now in condition for allowance.

Claims 1, 3, 5, 6, 8, 10, 12, 14, 16, 17, 19, 21, 23, 24, 26, and 27 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Shimmura (2003/0099477) or Simms et al (4,860,924).

As noted above, the present invention describes a unique system for printing a liquid toner wherein a charge control adjuvant having limited solubility in the liquid carrier is placed in contact with the liquid toner. This charge control adjuvant modulates the bulk conductivity of the toner composition and/or the charge per mass of the toner particles in the toner composition without using mechanical or electronic sensing apparatuses or complex control systems. Because the charge control agent has limited solubility in the liquid carrier, the charge control agent can be provided in the form, for example of a solid, semisolid or gel, and thus is available for control of bulk conductivity of the toner composition and/or the charge per mass of the toner particles in the toner composition on an as needed basis without metered addition of additional ingredients.

Shimmura describes a developing apparatus having a mechanism capable of reducing the conductivity of a toner liquid. When the conductivity of the toner liquid is increased as a result of the replenishment of the toner liquid, the conductivity of the toner liquid is lowered to a control initial value by a mechanism that can reduce the conductivity of the toner liquid. See the Abstract. The mechanism used to lower the conductivity of the toner liquid is a conductivity control apparatus by "vanishing" a surplus counter ion inside the toner liquid and a charge of an excessive-ion having the same polarity as the toner. See paragraph [0022]. This "vanishing" of the counterion is accomplished by applying a predetermined conductivity adjustment voltage to the conductivity adjustment roller, which is shown as reference number 75 in Fig. 2. See paragraph [0106]

Thus, Shimmura modulates the bulk conductivity of the toner composition by using a mechanical or electronic sensing apparatus and additionally using an electrically charged mechanical system to inject a charge into the toner composition, rather than by using a charge control adjuvant as presently claimed.

It is respectfully submitted that the present system for printing a liquid toner wherein a charge control adjuvant having limited solubility in the liquid carrier is placed in contact with the liquid toner to modulate the bulk conductivity of the toner composition and/or the charge per mass of the toner particles in the toner composition would not have been suggested or rendered obvious by the teaching of use of an electro-mechanical system as described in Shimmura.

Simms describes a copier wherein charge director is supplied to a liquid developer in response to a conductivity measurement. In this system, a developer (i.e. a working toner suspension) is supplied with a toner concentrate deficient in charge director in response to an optical transmissivity measurement. Conductivity of the developer is measured by a pair of spaced electrodes immersed in the developer and through which a variable alternating current is passed. See the abstract. Charge director is thus added to the developer in response to an electronic sensing apparatus. The charge director is soluble in the carrier liquid, as evidenced by the fact that no stirring is required to maintain the charge director in solution (in contrast to the stirring systems provided for the working toner suspension and the toner concentrate). See column 3, line 66 to column 4, line 5.

It is respectfully submitted that the present system for printing a liquid toner wherein a charge control adjuvant having limited solubility in the liquid carrier is placed in contact with the liquid toner to modulate the bulk conductivity of the toner composition and/or the charge per mass of the toner particles in the toner composition would not have been suggested or rendered obvious by the teaching of use of an electronic monitoring apparatus to determine when a soluble charge director should be added to the toner as described in Shimmura.

Conclusion

In view of the above remarks and amendments, it is respectfully submitted that the foregoing is fully responsive to the outstanding Office Action. Early favorable consideration of the above application is earnestly solicited. In the event that a phone conference between the Examiner and the Applicant's undersigned attorney would help resolve any issues in the application, the Examiner is invited to contact said attorney at (651) 275-9811.

Respectfully Submitted,

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